REMARKS

Claims 1-76 were pending in this application. Claims 1-12, 18,-45, and 51-76 have been previously withdrawn and are now canceled. Claims 13-17 and 46-50 have been have been rejected. Claims 13, 16 and 46 have been amended. Therefore, Claims 13-17 and 46-50 are pending in the Application. Reconsideration of the application based arguments submitted below is respectfully requested.

Claim Rejections - 35 U.S.C. §112

Claims 13-17 and 46-50 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. The office action questioned the terms "system operational working pressures" in Claims 13 and 46 and "oversized by a factor of at least 10% above the size of a filter dryer used in an R-22 based system" in claims 17 and 50.

The office action alleges the system's operational working pressure is not simply a function of the refrigerant used in the system, as generally taught by the instant application, but rather, also is a function of other aspects of the system itself.

Factually, a specific pressure in any refrigerant system can be somewhat raised or lowered via tubing sizes, refrigerant charge amounts, expansion device sizes, and temperatures of the heat exchangers. This is well understood by those skilled in the art, and the examiner is partially correct in that specific working pressures can be affected by various system aspects. However, it is also well understood in the art that system operational working pressures are those pressures encountered within a reasonable operative range, which range is determined by the particular refrigerant utilized for varying applications. Each refrigerant has its own separate evaporating and condensing temperatures under respective pressure conditions. Therefore, the selection of a refrigerant suitable for the primary purpose involved (such as residential heating/cooling or commercial refrigeration, or the like) is of primary importance in any particular system design.

In fact, in the Schuster case (US 6,354,097 B1) cited by the examiner, Schuster himself refers to R-410A as having operating pressures up to 70% higher than R-22 (in an air-source heat pump system application as described by Schuster), realizing that those skilled in the art understand what "operating pressures" mean. See col. 1, lines 2,-31.

Additionally, the office action alleges the "specification does not provide a standard for ascertaining the requisite degree" of the filter dyer. The use of a

filter dryer that is at least 10% oversized from that used in an R-22 based system is well understood by those skilled in the art. Standard filter designs for R-22 systems are well understood to typically be comprised of a filter size having about 3 to 4 cubic inches per ton of system design capacity.

The prior art also examples various size of filter dyers used in R-12 systems. For example United States Patent 5,240,483 is specifically direct at filter dyers. Even if one was not aware of the size of a filter dryer used in an R-22 system, one could obviously go and look at any one of millions of installations in the USA, and in the world, on as many different tonnage sized systems as wished, and then utilize a filter dryer that was at least 10% larger in a direct expansion (DX) system of equivalent tonnage design capacity.

A significant purpose for the use of such an oversized filter in a DX system design is to help prevent loss of adequate system operational pressures if the filter becomes somewhat clogged with debris, as higher system operational pressures have been found by the current inventor to be of more importance for optimum system operational efficiencies in a DX system utilizing an R-410A refrigerant than in a lower operational pressure air-source R-22 system design. The present invention continuously points to the preference of higher refrigerant operating pressures than those of an R-22 air-

source system design, as opposed to Schuster which teaches to stay as close as possible to the lower operating pressures of an R-22 system.

The office action alleges on page 6, in section 12, that it would have been obvious to provide a larger filter since an R-410A system was operating under increased working pressures (now implying/acknowledging that an R-410A refrigerant system does operate at a greater working pressure than an R-22 system, which Applicant has stated to be well understood by those skilled in the art). Factually, greater operating pressures have nothing to do with the size of the filter, but, rather, only with the thickness and burst strength of the filter's containment/encasement wall. The burst strength of the filter's containment wall can be increased by at least one of a heavier gauge wall and a stronger material (titanium rather than a low grade steel, for example). The actual size of the filter within the containment wall shell is what would need to be preferably increased by at least 10%, as taught in an enhanced DX system R-410A refrigerant system design. The minimum 10% increase in the actual filter size itself would be well understood by those skilled in the art.

Additionally, Applicant has amended Claim 16 to correct the insufficient antecedent basis.

As such, Applicant respectfully requests that the rejection of Claims 213-17 and 46-50 under 35 U.S.C. § 112 be withdrawn.

Claim Rejections under 35 U.S.C. § 102 and § 103

Claims 46-48 have been rejected under 35 U.S.C. §102(b) as being anticipated by Schuster (US 6,354,097).

Claims 13-15 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuster in view of Wiggs (5,946,928).

Claim 16 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuster in view of Wiggs in further view of Komatshubrara et al (US 2002/0194862).

Claims 49 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuster in view of Komatshubrara et al.

Claim 17 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuster in view of Wiggs in further view of Smolinsky (US 6,227,003).

Claim 50 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuster in view of Smolinsky.

Claim Amendments - direct expansion geothermal heat exchange system

Applicant has amended the independent Claims 13 and 46 to directly incorporate the use of the refrigerant in a direct expansion geothermal heat exchange system. The prior art, as will be further explained below, does not teach the claim features in a direct expansion system.

Schuster

Schuster himself refers to R-410A as having operating pressures up to 70% higher than R-22 as in an air-source heat pump system application. Schuster only refers to potential high pressure situations as encountered in air-source heat pumps and to the dangers of exceeding refrigerant tubing burst strengths. See col. 5.

In fact the 600 Psig pressure concerning Schuster (see col. 4, lines 28-31), in the cooling mode in an R-410A air source system, would never occur in an adequately designed R-410A DX system without a malfunction in the system, say for example a refrigerant transport valve was accidentally closed during operation.

The teaching of Schuster's is to design around the use of a refrigerant with higher operating pressures than that of R-22, such as R-410A, in conventional air-source system designs so as not to have to change existing refrigerant transport tubing in the indoor coil or the vapor line (see col. 2, lines

44-53), and so as to save the expense of otherwise replacing the indoor coil and line set (see col.4, lines 36-46).

Even in an air-source heating/cooling system, Schuster's does not to teach the use of a refrigerant, with a higher operating pressure than that of R-22. The present invention does, however, teach the use of a refrigerant, with a higher operating pressure than that of R-22 for a DX system application.

Thus, the allegation on page 5 that "it would have been obvious to combine the working pressures of Schuster with the heat exchange system of Wiggs since the refrigerant advantageously assists in effecting heat transfer" is incorrect.

The purpose of Schuster's invention, to design around the potential use of a refrigerant with higher operational pressures than that of R-22 in an air-source heat pump, was taught to be accomplished by means of controls and temperature sensors designed to reduce the speed of the outdoor fan (an outdoor fan is non-existent in present DX system design) when maximum temperatures (corresponding to maximum operational pressures) were encountered. See col. 3, lines 8-21, and see col. 4, lines 47-56. Again, the entire purpose of Schuster's invention was to teach how to keep pressures low enough, to remain within safe working load ranges of existing refrigerant transport tubing, in an air-source heat pump system when any refrigerant was

utilized with an operating pressure greater than R-22, with R-410A only being used as an example. Thus, Schuster does not teach that an R-410A refrigerant advantageously assists in effecting heat transfer.

The fact that R-410A has a greater operating pressure than R-22 is well understood by those skilled in the art. As noted by the examiner, Schuster alleges R-410A has operating pressures up to 70% higher than R-22 (col. 1, lines 29-31). However, there is nothing taught by Schuster to disclose how, why, or even if, such a higher pressure refrigerant should be utilized in a DX system. Schuster teaches absolutely nothing about a DX system, which has very unique design concerns far different from air-source heat pumps. The mere fact that any refrigerant has a greater operating pressure than R-22 does not teach whether or not such a refrigerant should be utilized in a DX system design.

Wiggs ('928) and Komatsubara

The Wiggs' patent (US 5,946,928) discloses a DX heating/cooling system, with a horizontally oriented pit, within which a matrix of finned tubing is placed, but does not teach whether or not a refrigerant with an operating pressure greater than that of R-22 is preferred in a DX system design. The simple disclosure and/or existence of any particular refrigeration system does

not, in and of itself, teach whether or not a refrigerant with a greater, or lesser, operational range than that of R-22 should preferably be utilized. In fact, the only refrigerant disclosed in Wiggs' '928 patent is R-22, or the like (ammonia reportedly has operating pressures like R-22, for example). See col. 1, lines 26-29. Only after extensive and costly testing did the current inventor discover various advantages of utilizing a refrigerant, with greater operational pressures than R-22, in a DX system design, as taught by the present invention.

Komatsubara is cited as a basis for rejecting the use of a polyol ester lubricating oil, in conjunction with a preferred R-410A refrigerant, in a DX system application, as taught by the present invention. Under paragraph 11, the office action alleges it would have been obvious to have combined the refrigeration system and working pressures of Shuster with the lubricating oil of Komatsubara, since polyol ester is an environmentally safe lubricating oil that would prevent seizing of the compressor.

Again, the refrigeration system of Shuster is an air-source system, not a DX system. The exterior heat exchange elements of an air-source system are subject to widely varying atmospheric temperature swings, which can materially adversely affect system operational efficiencies and system component requirements. A DX system operates in generally stable sub-surface temperature conditions, and is, therefore, not subject to extreme seasonal

operational efficiency losses, and operates at peak efficiencies by means of system designs (with various such designs taught by Wiggs '928 patent) that vary from those of an air-source heat pump. Also again, Shuster teaches a means to keep system operational pressures near those of R-22, not materially above those of R-22, as taught by the present invention in a DX system application. The mere mention of a know fact that R-410A has higher operational pressures than an R-22 system is not deemed as a system operational advantage by Shuster.

The examiner alleges that since polyol ester (which is one of many oils mentioned in the Komatsubara see page 3, paragraphs 0037-0039) is an environmentally safe lubricating oil that would prevent seizing of the compressor, it would have been obvious to have combined same with Shuster's air-source heat pump system, and hence inferring it would have been obvious to use with R-410A in Wiggs' DX heat pump system. In fact R-410A refrigerant is never even named in the Komatsubara invention.

Further, the Komatsubara invention is designed to teach the provision of an odorant to flammable refrigerants (see page 1, paragraph 0002, and paragraph 0009, and see page 2, paragraph 0026's first two sentences), which odorant is compatible with such flammable refrigerants and their compressors' lubricating oils. As is well understood by those skilled in the art, and as clearly

set forth in R-410A's widely published material safety data sheets, R-410A is not a flammable refrigerant.

The mere fact that Komatsubara mentions polyol ester as one of multiple oils that may be used in conjunction with flammable refrigerants, in an air-source heat pump, could not realistically be utilized to determine the compressor lubricating oil of choice in a DX system utilizing an R-410A refrigerant. Komatsubara invention is described as pertaining to use in an air-source system, as FIG. 1 illustrates the flow of refrigerant when defrosting (see page 2 and 3, paragraph 0031). The DX systems, as taught by Wiggs in the present invention, and in the referenced '928 patent, do not have a defrost cycle.

Smolinsky

The office action references Smolinsky as a reason that it would have been obvious to combine the refrigeration system and working pressures of Schuster and Wiggs with the filter dryer of Smolinsky, since a filter dryer advantageously removes moisture and contaminants from refrigeration systems. The fact that a filter dryer removes moisture and contaminants is not a novel idea/invention specific to Smolinsky. Such as stated purpose of a filter dryer is well known by those skilled in the art.

However, prior to the present invention, it was never taught to be preferable to utilize a filter dryer, which was at least 10% larger than that used in an R-22 system, in an R-410A, DX system. Further, the only arguably unique feature even disclosed by Smolinsky's invention was the use of a coiled section of refrigerant transport tubing near the refrigerant entry end of the evaporator in an air-source heat pump to serve as a reservoir for any excess liquid refrigerant (see col. 5, lines 6-9). Such a coiled section of refrigerant transport tubing alone would have virtually no advantage in a DX system, and would only incur additional costs. Again, there is absolutely no correlation to, or hint of, the preferential use for at least a 10% larger filter dryer in an R-410A, DX system, as first taught by the present invention.

Applicant has commented on some of the distinctions between the cited references and the claims to facilitate a better understanding of the present invention. This discussion is not exhaustive of the facets of the invention, and Applicant hereby reserves the right to present additional distinctions as appropriate. Furthermore, while these remarks may employ shortened, more specific, or variant descriptions of some of the claim language, Applicant respectfully notes that these remarks are not to be used to create implied

limitations in the claims and only the actual wording of the claims should be considered against these references.

The Commissioner is authorized to charge any deficiency or credit any overpayment associated with the filing of this Response and Amendment to Deposit Account 23-0035.

Respectfully submitted,

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